

Lows.—No. VIII was first noted off the north Pacific coast; Nos. I, IV, and VII to the north of Montana; Nos. V and VI in the south Plateau; No. X in Texas, and Nos. II, III, and IX in the eastern Gulf. The beginning of these last three was especially interesting, as there was a more or less disturbed condition in the eastern Gulf of Mexico for several days before the storms gathered enough intensity to move to the north and east. The general paths of the storms was toward the east and north. No. VI was last seen in Manitoba; Nos. I and VIII in Nebraska; No. III off Cape Cod, and Nos. II, V, IX, and X in or near the Gulf of St. Lawrence.—*H. A. Hazen, Professor.*

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I.....	1 a.m.	43	127	5 p.m.	37	102	1,650	4.5	367	15.3
II.....	6 a.m.	51	91	9 p.m.	47	61	1,580	8.5	437	18.2
III.....	12 p.m.	52	117	17 a.m.	43	64	3,380	4.5	740	30.8
IV.....	17 p.m.	47	109	24 a.m.	43	69	3,540	6.5	545	22.7
V.....	24 p.m.	48	118	28 p.m.	47	61	2,830	4.0	705	29.4
VI.....	26 p.m.	41	114	*1 a.m.	47	57	3,090	5.5	562	23.4
Total.....							15,960	28.5	3,356	189.8
Mean of 6 paths.....							2,660		559	23.3
Mean of 28.5 days.....									560	23.3
Low areas.										
I.....	†29 p.m.	54	119	2 a.m.	41	100	1,350	2.5	540	22.5
II.....	3 a.m.	22	83	7 a.m.	46	59	2,280	4.0	570	23.8
III.....	7 a.m.	29	84	9 p.m.	40	69	1,500	2.5	600	25.0
IV.....	7 p.m.	55	116	10 a.m.	49	92	1,200	2.5	490	20.0
V.....	11 a.m.	40	108	14 p.m.	51	62	2,790	3.5	797	33.2
VI.....	14 a.m.	34	111	16 p.m.	53	95	1,620	2.5	648	27.0
VII.....	16 p.m.	49	110	18 p.m.	48	84	1,290	2.0	645	26.9
VIII.....	18 p.m.	46	128	24 a.m.	42	98	2,400	5.5	453	18.9
IX.....	26 a.m.	19	79	*2 a.m.	48	56	3,150	7.0	450	18.7
X.....	26 p.m.	30	100	30 a.m.	48	53	3,120	8.5	891	37.1
Total.....							20,790	35.5	6,074	253.1
Mean of 10 paths.....							2,079		607	25.3
Mean of 35.5 days.....									586	24.4

* November.

† September.

RIVERS AND FLOODS.

In the Mississippi River during the month of October, 1899, the stages of water were above the average, and higher than during the corresponding season of 1898, while the Missouri and that portion of the Mississippi south of Alton, Ill., were considerably lower than in 1898. The higher stages above were due to heavy rains at the headwaters of the Mississippi, supplemented by lighter falls southward through Iowa. At St. Paul a stage of 8.8 feet was reached on the 24th, the highest for the season since 1881, when a stage of 13 feet was attained on October 9th.

A marked rise also occurred in the rivers of the South Atlantic States in the early part of the month on account of the heavy rains which resulted from the storm which moved up the South Atlantic coast from the 5th to the 7th. The crests were reached about the 9th. At Fayetteville, N. C., the Cape Fear River rose 15 feet in three days, and at Camden, S. C., the Wateree River rose 13 feet in four days.

Over the remaining rivers low stages continued with practically no interruption. In the Mississippi system below the mouth of the Missouri the waters were lowest during the closing days of the month, while over the eastern rivers the times of lowest stages were variable.

The highest and lowest water, mean stage, and monthly range at 121 river stations are given in the accompanying

table. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

Heights of rivers referred to zeros of gages, October, 1899.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
<i>Mississippi River.</i>								
St. Paul, Minn.....	1,964	14	8.8	24	4.0	9-11	5.9	4.8
Reads Landing, Minn.....	1,884	12	6.3	29, 30	1.4	12, 15	3.1	4.9
La Crosse, Wis.....	1,819	12						
North McGregor, Iowa.....	1,759	18	6.1	31	2.0	18-20	3.0	4.1
Dubuque, Iowa.....	1,699	15	5.4	31	2.1	19	2.9	3.3
Leclaire, Iowa.....	1,609	10	2.9	31	1.2	20-23	1.6	1.7
Davenport, Iowa.....	1,598	15	3.8	31	1.9	21, 22	2.4	1.9
Muscataine, Iowa.....	1,562	16	4.6	31	2.4	23	3.0	2.2
Galland, Iowa.....	1,472	8	1.6	31	0.9	19-26	1.1	0.7
Keokuk, Iowa.....	1,463	15	2.4	31	0.7	22-26	1.2	1.7
Hannibal, Mo.....	1,402	13	3.2	1, 2	1.9	25-27	2.3	1.3
Grafton, Ill.....	1,306	23	4.1	1	2.7	25-27	3.2	1.4
St. Louis, Mo.....	1,264	30	4.8	1	2.9	26	3.7	1.9
Chester, Ill.....	1,189	36	3.1	1	1.7	26	2.3	1.4
Memphis, Tenn.....	843	33	2.2	1	0.5	31	1.1	1.7
Helena, Ark.....	767	42	4.4	1	1.8	30, 31	2.7	2.6
Arkansas City, Ark.....	685	42	3.9	1	1.1	21-24, 31	2.0	2.8
Greenville, Miss.....	595	42	3.5	1, 2	1.4	30-31	2.2	2.1
Vicksburg, Miss.....	474	45	2.2	1	1.0	25-27, 31	0.2	3.2
New Orleans, La.....	108	16	4.6	4	2.9	18-20	3.5	1.7
<i>Missouri River.</i>								
Bismarck, N. Dak.....	1,309	14	2.2	3	1.5	14, 15	1.8	0.7
Pierre, S. Dak.....	1,114	14	2.7	1	2.4	13-17, 20-28	2.5	0.3
Sioux City, Iowa.....	784	19	5.1	18	4.7	9	4.9	0.4
Omaha, Nebr.....	669	18	6.6	1-6	6.4	12-15, 22-28	6.5	0.2
Plattsmouth, Nebr.....	641							
St. Joseph, Mo.....	481	10	1.4	28	0.7	18-15, 24, 25	0.9	0.7
Kansas City, Mo.....	388	21	6.0	28, 29	5.3	15-17	5.5	0.7
Boonville, Mo.....	199	20	5.7	1, 2	4.9	21-23	5.1	0.3
Hermann, Mo.....	103	24	5.2	1, 2	4.5	20-22	4.8	0.7
<i>Illinois River.</i>								
Peoria, Ill.....	135	14	4.6	28	4.0	1-11	4.2	0.6
<i>Youghiogheny River.</i>								
Confluence, Pa.....	59	10	1.0	1	0.1	28, 29	0.5	0.9
West Newton, Pa.....	15	23	0.4	1	0.0	30-31	0.1	0.4
<i>Allegheny River.</i>								
Warren, Pa.....	177	14	1.0	3	0.0	27-31	0.3	1.0
Oil City, Pa.....	123	13	1.4	2	0.1	27-29	0.5	1.3
Parker, Pa.....	73	20	1.1	4, 5	0.1	24-29	0.5	1.0
<i>Monongahela River.</i>								
Weston, W. Va.....	161	18	— 1.0	1, 2	— 2.0	22-25	— 1.7	1.0
Fairmont, W. Va.....	119	25	0.6	1	0.1	26-29	0.3	0.8
Greensboro, Pa.....	81	18	6.8	1	6.0	22-31	6.3	0.5
Lock No. 4, Pa.....	40	28	8.5	1-3	5.9	31	7.4	2.6
<i>Conemaugh River.</i>								
Johnstown, Pa.....	64	7	1.2	1-3, 11, 12	0.5	27-30	0.9	0.7
<i>Red Bank Creek.</i>								
Brookville, Pa.....	35	8	0.4	29-31	0.2	1-28	0.2	0.2
<i>Beaver River.</i>								
Ellwood Junction, Pa.....	10	14	— 0.2	1, 2	— 0.5	7, 16, 17	— 0.4	0.3
<i>Great Kanawha River.</i>								
Charleston, W. Va.....	61	30	6.8	1, 2, 12	6.4	25, 26	6.6	0.4
<i>New River.</i>								
Hinton, W. Va.....	95	14	1.5	12	1.0	23-29	1.1	0.5
<i>Cheat River.</i>								
Rowlesburg, W. Va.....	36	14	1.0	1	— 1.2	26-31	— 0.3	2.2
<i>Ohio River.</i>								
Pittsburg, Pa.....	966	22	6.2	1	5.2	6, 10, 14	5.6	1.0
Davis Island Dam, Pa.....	960	25	2.9	1, 4-6	1.5	29	2.2	1.4
Wheeling, W. Va.....	875	36	2.8	6	1.1	22-31	1.7	1.7
Parkersburg, W. Va.....	785	36	3.0	9	1.5	25-28	2.2	1.5
Point Pleasant, W. Va.....	703	39	2.0	10-13	1.1	27-31	1.5	0.9
Catlettsburg, Ky.....	651	50	1.7	10	0.8	29-31	1.2	0.9
Portsmouth, Ohio.....	612	50	3.2	14, 15	2.2	29-31	2.7	1.0
Cincinnati, Ohio.....	499	50	4.4	17	3.5	25-30	3.9	0.9
Louisville, Ky.....	367	28	5.0	1	4.2	28	4.6	0.8
Evansville, Ind.....	184	35	2.6	1-3	1.6	31	2.0	1.0
Paducah, Ky.....	47	40	1.1	1	0.5	13, 16	0.8	0.6
Cairo, Ill.....	1,073	45	4.7	1	3.0	15, 16, 27	3.5	1.7
<i>Muskingum River.</i>								
Zanesville, Ohio.....	70	20	6.1	31	5.6	28	5.8	0.5
<i>Miami River.</i>								
Dayton, Ohio.....	69	18	1.1	29	0.5	1, 22	0.7	0.6
<i>Wabash River.</i>								
Mount Carmel, Ill.....	50	15	1.0	23, 24, 28-30	0.3	1-18	0.6	0.7
<i>Licking River.</i>								
Falmouth, Ky.....	30	25	1.6	29, 31	0.3	11-19	0.5	1.3
<i>Clinch River.</i>								
Spears Ferry, Va.....	156	20	— 0.2	9, 30, 31	— 0.8	26, 27	— 0.6	0.6
Clinton, Tenn.....	46	25	3.4	1	1.8	24-28	2.2	1.6
<i>Tennessee River.</i>								
Knoxville, Tenn.....	614	28	0.2	11	— 1.2	27-29	— 0.7	1.4
Kingsport, Tenn.....	534	25	1.2	11, 12	0.5	3, 4	0.8	0.7
Chattanooga, Tenn.....	490	33	1.9	12	0.8	6, 7, 27, 28	1.1	1.1
Bridgeport, Ala.....	390	24	0.6	13	0.1	5-7, 18, 19, 28-31	0.2	0.5
Florence, Ala.....	220	16	0.4	16-18	— 0.1	10, 30, 31	0.1	0.8
Riverton, Ala.....	190	25	— 1.0	16-18	— 1.9	9, 10, 30, 31	— 1.6	0.9
Johnsonville, Tenn.....	94	21	0.7	18-20	0.0	11-13	0.3	0.7

Heights of rivers referred to zeros of gages—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.	
			Height.	Date.	Height.	Date.			
<i>Cumberland River.</i>	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>			<i>Feet.</i>	<i>Feet.</i>	
Burnside, Ky.....	434	50	-0.4	12-15, 23-31	-0.7		7	-0.5	0.3
Carthage, Tenn.....	237	40	0.5	18	-0.1		8	0.2	0.6
Nashville, Tenn.....	175	40	1.0	18	0.6	{	2, 3, 6, 7, 7, 9, 10	0.8	0.4
<i>Arkansas River.</i>									
Wichita, Kans.....	736	10	3.1	27	1.5		15	1.9	1.6
Webbers Falls, Ind. T....	413	33	2.4	31	1.3		18-15, 19-25	1.4	1.1
Fort Smith, Ark.....	351	32	3.1	31	1.4		10, 11	1.9	1.7
Dardanelle, Ark.....	256	21	1.6	3-5	0.9		26, 27	1.2	0.7
Little Rock, Ark.....	176	23	2.9	1, 2, 6	2.3		24-31	2.6	0.6
<i>White River.</i>									
Newport, Ark.....	150	26	1.3	19, 20	0.7		11, 12	1.0	0.6
<i>Yazoo River.</i>									
Yazoo City, Miss.....	80	25	-2.3	31	-2.6		11-28	-2.5	0.3
<i>Red River.</i>									
Arthur City, Tex.....	688	27	13.7	30	4.8		24-26	5.9	8.9
Fulton, Ark.....	565	23							
Shreveport, La.....	449	39	2.4	2	-0.7		30, 31	0.4	3.1
Alexandria, La.....	189	33	-0.5	7-11	-2.4		23-28	-1.6	1.9
<i>Ouachita River.</i>									
Camden, Ark.....	340	39	3.0	31	2.4		14-20	2.6	0.6
Monroe, La.....	100	40	0.0	1-31	0.0		1-31	0.0	0.0
<i>Atchafalaya River.</i>									
Melville, La.....	100*	31	3.8	5-8, 11, 12	2.3		31	3.3	1.5
<i>Susquehanna River.</i>									
Wilkesbarre, Pa.....	178	14	-1.0	1, 2	-2.0		5-31	-1.9	1.0
Harrisburg, Pa.....	70	17	1.1	1	0.2		24-26	0.5	0.9
<i>W. Br. of Susquehanna.</i>									
Williamsport, Pa.....	35	20	0.5	2, 3	0.1		30, 31	0.3	0.4
<i>Juniata River.</i>									
Huntingdon, Pa.....	80	24	3.0	1-9	2.8		10-31	2.9	0.2
<i>Potomac River.</i>									
Harpers Ferry, W. Va....	170	16	1.2	1	0.2		29-31	0.6	1.0
<i>James River.</i>									
Lynchburg, Va.....	257	18	0.6	8	0.0		18-30	0.1	0.6
Richmond, Va.....	110	12	0.7	8	-2.8		29	-1.2	3.5
<i>Roanoke River.</i>									
Weldon, N. C.....	90	40	10.4	10	7.5		4, 5	8.1	2.9
<i>Cape Fear River.</i>									
Fayetteville, N. C.....	100	38	17.0	9	1.4		5	4.6	15.6
<i>Lumber River.</i>									
Fairbluff, N. C.....	10	6	2.7	21	0.3		7	1.4	2.4
<i>Edisto River.</i>									
Edisto, S. C.....	75	17	5.0	11	1.2		5	2.9	3.8
<i>Pedee River.</i>									
Cheraw, S. C.....	145	27	7.1	9	0.7		4, 5	1.9	6.4

Heights of rivers referred to zeros of gages—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
<i>Black River.</i>	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>
Kingstree, S. C.....	60	12	3.0	1	1.6	24-31	2.1	1.4
<i>Lynch Creek.</i>								
Effingham, S. C.....	35	12	8.5	16	2.3	6	3.9	6.2
<i>Santee River.</i>								
St. Stephens, S. C.....	50	12	7.0	13	— 0.9	7	2.2	7.9
<i>Congaree River.</i>								
Columbia, S. C.....	37	15	3.7	6	0.0	1, 3, 24	0.5	3.7
<i>Watauga River.</i>								
Camden, S. C.....	45	24	15.0	9	2.7	4, 5, 25	4.6	12.3
<i>Waccamaw River.</i>								
Conway, S. C.....	40	7	3.0	7	1.2	1, 2	2.1	1.8
<i>Savannah River.</i>								
Calhoun Falls, S. C.....	347	3.9	8	2.1	2, 3, 27, 28	2.5	1.8
Augusta, Ga.....	268	32	14.0	9	4.7	3	6.7	9.3
<i>Broad River.</i>								
Carlton, Ga.....	30	4.3	8	1.9	1-4	2.2	2.4
<i>Flint River.</i>								
Albany, Ga.....	80	20	3.4	23	— 0.4	1	1.8	3.8
<i>Chattahoochee River.</i>								
West Point, Ga.....	239	20	3.1	16	1.7	11	2.3	1.4
<i>Coosa River.</i>								
Rome, Ga.....	225	30	1.0	11	0.3	2-5	0.6	0.7
Gadsden, Ala.....	144	18	0.5	12	— 0.8	1-6	— 0.5	1.3
<i>Alabama River.</i>								
Montgomery, Ala.....	265	35	0.8	28	— 0.4	2, 3	0.2	1.2
Selma, Ala.....	212	35	0.0	24, 25	— 1.6	7	— 0.6	1.6
<i>Tombigbee River.</i>								
Columbus, Miss.....	285	33	— 3.5	21, 29, 30	— 3.8	1, 2, 11, 12, 16, 24, 25	— 3.7	0.3
Demopolis, Ala.....	155	35	— 3.3	1-6, 20	— 3.6		— 3.5	0.3
<i>Black Warrior River.</i>								
Tuscaloosa, Ala.....	90	43	— 0.6	28	— 1.8	3, 4	— 1.1	1.2
<i>Columbia River.</i>								
Umatilla, Ore.....	270	25	6.6	1, 2	4.7	21, 31	5.5	1.9
The Dalles, Ore.....	166	40	10.0	1	6.6	31	7.8	3.4
<i>Willamette River.</i>								
Albany, Ore.....	99	20	11.5	21	1.2	14-16	3.2	10.3
Portland, Ore.....	10	15	7.8	20, 21	2.3	14	4.4	5.5
<i>Sacramento River.</i>								
Red Bluff, Cal.....	241	23	4.0	21	— 0.9	1-10	0.2	4.9
Sacramento, Cal.....	70	29	17.5	22	7.4	4-12	9.9	10.4

* Distance to Gulf of Mexico.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Rainfall is expressed in inches.

Alabama.—The mean temperature was 66.2°, or 3.3° above normal; the highest was 94°, at Jasper on the 13th, and the lowest, 29°, at Jasper on the 1st. The average precipitation was 2.18, or 0.08 above normal; the greatest monthly amount, 7.03, occurred at Newton, and the least, 0.55, at Warrior.—*P. P. Chaffee.*

Arizona.—The mean temperature was 63.0°, or 1.1° below normal; the highest was 107°, at Sentinel on the 1st, and the lowest, 15°, at Snowflake on the 27th. The average precipitation was 0.80, or 0.06 below normal; the greatest monthly amount, 4.89, occurred at Flagstaff, while none fell at several stations.—*W. G. Burns.*

Arkansas.—The mean temperature was 65.6°, or 4.0° above normal; the highest was 101°, at Conway on the 13th, and the lowest, 28°, at Mossville on the 31st. The average precipitation was 2.88, or 0.55 above normal; the greatest monthly amount, 6.52, occurred at Winslow, and the least, 0.76, at Helena.—*E. B. Richards.*

California.—The mean temperature for the State, obtained by weighting the reports from 281 stations, so that equal areas have about the same weight, was 58.1°, or 2.7° below normal, as determined from 195 records; the highest was 107°, at Healdsburg, Sonoma County, on the 8th, and the lowest, zero, at Bodie, Mono County, on the 14th. The average precipitation, as determined by the records of 300 stations, was 3.50; the excess, as indicated by reports from 204 stations, which have normals, was 2.59; the greatest monthly amount, 18.30, occurred at Laporte, Plumas County, while none fell at six stations in southern California.—*Alexander G. McAdie.*

Colorado.—The mean temperature was 46.4°, or nearly normal; the

highest was 97°, at Holyoke on the 1st, and the lowest, 8° below zero at Lake Moraine on the 27th. The average precipitation was 1.76, or 0.66 above normal; the greatest monthly amount, 6.36, occurred at Parachute, while none fell at Hugo, and only a trace at Cheyenne Wells, Crook, Fox, Seibert, Springfield, and Wray.—*P. H. Brandenburg.*

Florida.—The mean temperature was 73.4°, or 1.5° above normal; the highest was 94°, at Clermont on the 6th, and the lowest, 49°, at De Funiak Springs on the 30th. The average precipitation was 6.10, or 2.30 above normal; the greatest monthly amount, 29.10, occurred at Sebastian, and the least, 0.97, at Stephensville.—*A. J. Mitchell.*

Georgia.—The mean temperature was 65.4°, or 1.3° above normal; the highest was 94°, at Jesup on the 19th, and the lowest, 31°, at Clayton on the 1st. The average precipitation was 3.89, or 1.73 above normal; the greatest monthly amount, 8.24, occurred at Marshallville, and the least, 0.74, at Adairsville.—*J. B. Marbury.*

Idaho.—The mean temperature was 43.3°, or 2.2° below normal; the highest was 90°, at Hagerman on the 5th, and the lowest, 4°, at Chesterfield and Van Wyck on the 10th and 12th, respectively. The average precipitation was 2.29, or 1.18 above normal; the greatest monthly amount, 5.48, occurred at Idaho City, and the least, 0.42, at Burnside.—*S. M. Blandford.*

Illinois.—The mean temperature was 59.4°, or 4.9° above normal; the highest was 94°, at Decatur and Plumhill on the 14th, and the lowest, 23°, at Scales Mound on the 29th and at Streator on the 31st. The average precipitation was 3.23, or 0.96 above normal; the greatest monthly amount, 5.26, occurred at Cisne, and the least, 1.08, at Scales Mound.

Fall seeding was completed, with about the usual acreage of wheat, rye, and grasses, except in central district, where less wheat than usual was sown, owing to the continued dry weather the first decade of the month. Wheat is generally reported to be in splendid condition.—*C. E. Linney.*

Indiana.—The mean temperature was 59.2°, or 5.6° above normal; the highest was 95°, at Washington on the 15th, and the lowest, 22°,